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63. The heat shrinkable film according to Claim 61, wherein the homogeneous linear single site catalyzed copolymer is present in an outer layer.

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64. The heat-shrinkable film according to Claim 1, wherein the film has an impact strength of at least 56 pounds.---

REMARKS

I. Status of the Claims and Above Amendments to the Specification and Claims

The specification has been amended to claim priority from the various parent applications (all now abandoned) of the present application. The specification has also been amended to identify the patent on Page 8 line 27 as a Canadian patent. The specification erroneously identified this patent as a U.S. Patent, which it clearly is not. A copy of this patent is provided with this amendment. This Canadian patent is disclosed in Applicants' specification merely to show the state of the art, and is not being relied upon as a basis for any of Applicants' claims. Page 13 of the specification is amended to disclose the subject matter recited in Claims 13, 14, and 15 as originally filed. As such, Applicants contend that the above amendments to the specification contain no new matter.

With the entry of the above amendments, Claims 1-64 are pending in this application, with Claims 1, 16, 18, 28, 35, 36, 42, 43, and 57 being the pending independent claims. Each of the independent claims has been amended to recite the extrudate as being cooled by cascading water, as disclosed on Page 10 lines 24-27 of Applicants' specification. Each of the independent claims has

also been amended from “at least 0.906 g/cc” to ---at least 0.901 g/cc---. Support for this amendment can be found in the specification at, for example, Page 9 lines 21-25.

Support for newly-presented Claims 57-64 can be found in the specification of the application as filed. More particularly, support for Claim 57 can be found at, for example, Page 9 lines 21-25 in combination with Page 10 lines 22 through Page 11 line 6. Support for Claims 58 and 59 can be found at Page 9 lines 21-25. Support for Claim 60 can be found at Page 9 line 29 through Page 10 line 4. Support for Claim 61 can be found at Page 17 line 23 through Page 18 line 4. Support for Claims 62 and 63 is present in Claims 15 and 13, respectively, as filed, and now at Page 13 line 4 et seq per the amendment to the specification above. Support for Claim 64 can be found at Page 18 of the specification, in Table IV, which disclosed Example 18 as having a peak instrumented impact strength of 56.4 pounds.

II. The Rejection of Claims 1, 2, 3, 8, 9, 12-15, 36, 42, 43-54, and 56 as obvious over RALPH

In Paragraphs 1 and 2 of the 21 April Office Action states that Claims 1, 2, 3, 8, 9, 12-15, 36, 42, 43-54, and 56 are rejected under 35 USC 103(a) as unpatentable over U.S. Patent No. 5,272,016, to Ralph (“RALPH”). The Office Action states that RALPH discloses shrink film containing homogeneous ethylene/butene copolymer in a blend with plastomer having a density below 0.90 g/cc. The Office Action goes on to refer to a Certificate of Correction, which discloses the use of an Exxon EXACT™ ethylene butene copolymer having a density of 0.900 and a single melting point of about 92°C and a Mw/Mn of about 2, together with the statement in the Certificate of Correction that “Exxon classifies its Exact materials with densities of *at least about 0.900* as VLDPE.” [Emphasis Added.] The Office Action goes on to state that there does not appear to be

any distinction between films utilizing the 0.900 g/cc density resin and films utilizing Applicants' resin having a density of at least 0.906 g/cc, and accordingly that these density differences would have been obvious. With respect to process Claims 44-48, Paragraph 2 of the 21 April Office Action applies RALPH as in the rejection of Paragraph 1, and further states that Applicants acknowledge that orientation methods are well known to those skilled in the art.

In response, Applicants contend that each of Claims 1, 2, 3, 8, 9, 12-15, 36, 42, 43-54, and 56 are patentable over RALPH. Applicants note that the disclosure of homogeneous copolymer in RALPH is limited to Tafmer® resins and to EXACT® 3010C ethylene/butene polymer. See Col. 22 lines 45-68, Col 23 Table N and lines 20-61, as well as the Certificate of Correction dated 20 June 1995. RALPH has no disclosure of any other EXACT® polymer, and does not teach or suggest EXACT® polymers having densities above 0.900 g/cc.¹

In RALPH, only Film No. 25 and Film No. 26 contain the EXACT 3010C copolymer. RALPH discloses two effects of the EXACT 3010C in the blend with VLDPE and plastomer in Film No.s 25 and 26: (1) "...to desirably broaden the heat sealing range"², and (2) "...but the tear strength is significantly reduced." Clearly, the lowering of the tear strength is not a desirable film property, as the film is weakened. This would teach one of skill in the art that using the EXACT

¹ As support for increasing the density of the homogeneous copolymer above 0.900, the §103 rejection relies upon a statement of "at least about 0.900" set forth in the Certificate of Correction of 20 June 1995. However, Applicants direct attention to the fact that the language "at least about 0.900" is not present in USSN 855,403, filed March 23, 1992, but rather is first entered in the 19 February 1993 Preliminary Amendment accompanying the continuation application USSN 20,980, which matured into USPN 5,272,016, i.e., RALPH. As such, it is apparent that the content of the Certificate of Correction is only entitled to the filing date of the continuation application, i.e., the February 19, 1993 filing date of USSN 20,890. Since Applicants' are claiming priority from a November 13, 1992 filing date, the application filed 19 February 1993 is not prior art with respect to Applicants' claims.

² See Col. 23 line 26 of RALPH. However, note that the "broadening" data is reported as a lowering of the heat seal initiation temperature. See Table N, comparing Sample No. 24 with Sample No. 25 and Sample No. 26. It can be seen that without Exact 3010C, the heat seal initiation temperature was 295°F, but with the addition of EXACT

3010C would not enhance the strength of the film, but rather would significantly reduce the strength of the film. Note that Column 2 lines 64-65 of RALPH discloses an object of the invention being to provide a film having *high abuse resistance*. This object is met by use of VLDPE. But, in RALPH the EXACT® 3010C copolymer acts to lower the tear strength of the film, thereby working directly against one of the stated objectives of RALPH, and as such is clearly to the effect of *teaching away* from the use of polymers such as the EXACT® 3010C copolymer in the film of RALPH.

As to the broadening of the heat sealing range, even assuming, for the sake of argument only, that one of ordinary skill in the art might be motivated to use EXACT® 3010C copolymer in a sealant position in order to obtain the desirable broadening of the heat sealing range, while knowingly sacrificing a significant reduction in the tear strength of the resulting film, RALPH still does not motivate one of skill in the art to choose an EXACT® resin with a density *higher* than 0.900 g/cc. Increasing the density upward from 0.900 g/cc would include an increase in the melting point of the copolymer, which in turn would serve to defeat the desired broadening of the heat sealing range (i.e., lowering of the heat seal initiation temperature). That is, since a resin of higher density would have a higher melting point, the effect of the increased density would have exactly the opposite of the desired effect: the heat seal initiation temperature would be *elevated*, rather than being *lowered*. This elevation, in turn, would work against achieving the commercially advantageous quicker sealing.

3010C, the heat seal initiation temperature dropped to 225°F and 240°F, respectively, for Film No.s 25 and 26, respectively.

Applicants note that their claims, as amended hereinabove, are directed to resins having a density of “at least 0.901 g/cc.” To the extent that RALPH is prior art against Applicants’ claims³, Applicants contend that this density range is higher than the density of any homogeneous copolymer taught or suggested by RALPH. The disclosure of the “*about* 0.900 g/cc” (emphasis added) EXACT 3010C in RALPH includes a maximum of 0.9005 g/cc, and a minimum of 0.8995 g/cc. As such, RALPH clearly does not teach or suggest Applicants’ recited density of at least 0.901 g/cc. As argued above, RALPH actually teaches away from increasing the density of the homogeneous copolymer of 0.900, i.e., in teaching the use of the EXACT 3010C for the purpose of broadening the heat sealing range. Accordingly, it is apparent that Applicants’ claims are patentable over RALPH.

III. The Various §103 Rejections Relying upon SCHUT and Van der SANDEN as Secondary References

In Paragraphs 3, 4, 5, and 7 of the 21 April Office Action, various combinations of Claims 1-3 and 5-56 are rejected 35 USC 103(a) as unpatentable over various primary references (SCHOENBERG, EVERT et al, NEWSOME et al, and MUELLER et al) each in view of the SCHUT article and the VAN der SANDEN article as secondary reference documents. With respect to each of the primary references, the Office Action states that the primary reference discloses a multilayer heat shrinkable film comprising LLDPE in a blend with, for example, EVA, linear medium density polyethylene, polyvinylidene chloride, etc. While the Office Action admits that none of the primary references discloses a homogeneous copolymer (i.e., copolymer produced using single site catalyst), the Office Action notes that SCHUT teaches a new type of LLDPE

³ See Footnote 1, above.
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copolymers made using single site catalysts. The Office Action states that SCHUT discloses single site catalyzed copolymers having a density of at least 0.90 g/cc, and further states that SCHUT teaches using these copolymers in multilayer films and blends. The Office Action states that the primary references teach orientation using a double bubble method. The Office Action states that it would have been obvious to use the single site catalyzed copolymers in the heat shrinkable films of the primary references because SCHUT discloses the single site catalyzed copolymers as having far superior properties such as heat seal initiation temperature, higher dart impact strength, and better clarity. The Office Action refers to Van der SANDEN et al as teaching superior attributes of single site catalyzed copolymers and states that such copolymers are a choice material in the production of heat sealable films. In response to Applicants' arguments filed 18 November 1999, the Office Action states that the motivation to combine is based on the fact that each of the primary references teaches multilayer films and blends.

In response, Applicants contend that Claims 1-3 and 5-56 are patentable over each of the primary references in view of SCHUT and Van der SANDEN. Applicants agree that each of the primary references teaches a multilayer heat shrinkable film containing LLDPE, as well as blends of LLDPE and other polymers. However, the films disclosed by SCHUT and VAN der SANDEN et al are cast films or blown films, and as such are clearly not heat shrinkable films; they are not films which have been extruded and cooled to their solid state by cascading water, and thereafter heated to the softening temperature of the polymer and then stretched in the machine and transverse directions followed by being quenched, so that the film will return to its unstretched dimensions when heated, i.e., so that the film is a heat-shrinkable film.

The only films referred to in SCHUT are blown and cast films, neither of which is a heat shrinkable film. Applicants further point out that although SCHUT states that it is likely that the new very narrow MWD resins will be used in layers and blends (i.e., in *cast* and *blown* films) because of their high price, SCHUT addresses non-economic concerns, i.e., technical concerns, in stating:

For now, the high shear and low melt strength of the new resins, caused by their very narrow MWD, means that optimized blow molding and monolayer blown film grades aren't yet possible, Exxon says.
[SCHUT, at Page 17, Col 3]

Applicants have argued, in the Amendment filed 15 November 1999, the personal interview of 19 January 2000, and the personal interview of 10 October 2000, that the above-quoted statement in SCHUT is a teaching away from the use of the linear homogeneous resins for the making of a *heat-shrinkable* film. The above-quoted statement acknowledges the low melt strength of the "very narrow MWD" (i.e., homogeneous) resins from Exxon. Those of skill in the art recognized, at Applicants' 13 November 1992 filing date, that downward casting was (and for that matter, still is) the dominant commercial method for making heat shrinkable films, and that downward casting requires significantly greater melt strength than is required for the manufacture of a blown film. As such, one of skill in the art would have considered these very narrow MWD resins to be unsuitable for the commercial manufacture of heat shrinkable films. Applicants contend that this is a teaching away from the use of the very narrow MWD resins in the making of a heat-shrinkable film using cascading water cooling. Thus, there is no teaching or suggestion in SCHUT that would lead those of skill in the art to believe that the homogeneous Exxon copolymers

disclosed therein are suitable for the making of a heat-shrinkable film. Rather, taking SCHUT as a whole, one of ordinary skill may not be motivated to combine and may well consider the polymer described in SCHUT not to be useful for making a heat shrinkable film, due to the nature of the typical downward cast commercial production process for making heat shrinkable films, which requires adequate melt strength for downward casting. Finally, the disclosure of improved impact strength in SCHUT is accompanied by a description including "coextruded cast films", "3-mil film", and "monolayer blown film grades." None of these films is a heat shrinkable film. Applicants discovery of increased impact strength in a *heat shrinkable* film is clearly unexpected in view of SCHUT.

With respect to VAN der SANDEN et al, Applicants note that this document also fails to make any teaching regarding heat shrinkable films. Rather, the films disclosed in VAN der SANDEN et al are 50 micron *blown* films disclosed in the paragraph spanning the bottom of the first column of Page 155 and the top of the second column of this same page. These films are disclosed as being *blown* monolayer films which were back taped with polyester tape.

There are significant technical distinctions between blown films and heat shrinkable films. Applicants' claims are clearly directed to heat shrinkable films. Applicants films have different characteristics from blown films because they are produced by a process which is fundamentally different from the process used to make all blown films. That is, Applicants' claimed heat shrinkable films are produced by orientation while the polymer is in the solid state, i.e., at the softening temperature of the polymer. Moreover, each of the pending independent claims is hereinabove amended to recite the extrudate as being cooled to its solid state *by cascading water*.

This can only be accomplished using the downward casting process, which is the process used in the commercial manufacture of heat shrinkable films. Polymers having low melt strength tend to fall apart in the downward casting process if they are not adequately supported. Support is not required in an upward blown process, such as the process of Van der SANDEN and U.S. Patent No. 3,022,543, to Baird et al.⁴

In contrast, blown films are oriented while the polymer is molten. Thus, Applicants claimed films are fundamentally different from the films described in both SCHUT and VAN der SANDEN et al. Those of skill in the art recognize this fundamental difference, and as a result would not be led to use the new Exxon polymer in the commercial type processes for making heat shrinkable films described in any of the primary references. In fact, those of skill in the art, upon reading in SCHUT that the new Exxon polymers *lack adequate melt strength for the making of monolayer blown films*, would be more likely to be led away from trying the new Exxon polymers to make heat shrinkable films.

The fact that both SCHUT and VAN der SANDEN et al refer to various advantages from the new Exxon polymer (e.g., seal initiation, impact, improved optical properties, etc.) could be motivation to use the Exxon polymers in blown and cast films. However, one of skill in the art could not ignore the fact that the linear homogeneous copolymers are taught as having low melt strength. It is extremely unlikely that polymers so lacking in melt strength that they are unsuitable for making "monolayer blown film" could be suitable for the preparation of a heat shrinkable film using a downward cast process in which the extrudate is quenched with cascading water.

⁴ The Examiner directed attention to this patent in the personal interview of 10 October 2000, noting especially Figure 2 thereof.

Considering SCHUT and VAN der SANDEN et al each as a whole, clearly the teaching in SCHUT of low melt strength would lead the skilled artisan away from the use of these resins in heat shrinkable films. In summary, the significant differences between cast and blown films versus heat shrinkable films are differences which show that a prima facie case of obviousness is not present in any one or more of the primary references in view of SCHUT and VAN der SANDEN et al.

In addition to the above arguments, Applicants note that they have obtained unexpected results *in heat shrinkable films* using their recited homogeneous linear ethylene/alpha-olefin copolymer. More particularly, Applicants direct attention to Page 22 lines 19-27 of their specification, which is as follows:

The oriented multilayer films of Examples 11-22 were tested for free shrink and instrumented impact with the results given below in Table IV. It may be seen that when comparing the metallocene resin films of Examples 11 and 15 or 12 and 16 with the comparative example counterparts of 19 and 20, a substantial improvement in impact resistance is seen. Similarly, a comparison of Examples 13 and 17 or 14 and 18 with their respective comparative heterogeneous Examples 21 and 22 show an improved impact for the metallocene resins.

More particularly, the results in Table IV (Page 23, lines 1-16) show that the multilayer, *heat-shrinkable* films of Examples 11 and 15 have a peak impact strengths of 86.8 pounds and 77.4 pounds, respectively, while the *heat shrinkable* films of corresponding comparative Examples 19 and 20 have peak impact strengths of only 54.2 pounds and 55.1 pounds. Comparing the average of the impact of Examples 11 and 15 (83.0 pounds) against the average of the impact strengths of comparative Examples 19 and 21 (54.65 pounds), one can see a 58% increase in impact strength. Similar results hold for a comparison of Examples 12 and 16 when compared against comparative

Examples 19 and 20 (44.6% increase). It should be noted that this is a comparison of multilayer films all of which were: (a) exposed to the same level of irradiation (2MR), (b) all of which were oriented by trapped bubble method out of hot water at 195°F, and (c) all of which were 5 layer films with 4 identical layers and a fifth layer which contained an ethylene/alpha-olefin having a density of 0.902 g/cc (Examples 11), 0.905 g/cc (Examples 15, 19, and 21). Thus, the only significant difference in the films was the type of polymer, i.e., homogeneous versus heterogeneous. The multilayer *heat shrinkable* films containing the linear homogeneous copolymers exhibited an average impact strength more than 50% higher than the heat shrinkable films containing virtually identical heterogeneous copolymers. Applicants contend that this is evidence of unexpected result. Moreover, it was in their application as filed, and was not produced after the PTO rejected Applicants claims.

VAN der SANDEN et al makes no mention of heat shrinkable films, not to mention impact resistant heat shrinkable films of Applicants' invention. VAN der SANDEN et al has no teaching or suggestion that the new Exxon polymers can provide heat shrinkable films with impact strength more than 50 percent greater than was obtained using corresponding heterogeneous copolymers.

Applicants contend that until their invention, there was a substantial element of chemical unpredictability in whether a linear homogeneous ethylene/alpha-olefin copolymer could have been oriented in the typical downward casting (cascading water) commercial process used to make heat shrinkable films. Some polymers have enough wall strength for conversion to heat shrinkable films by a downward casting process, while others have not had the requisite wall strength. Applicants have discovered that Exxon's metallocene catalyzed linear ethylene/alpha-olefin copolymers

inherently lack adequate melt strength to undergo the downward casting process used in the commercial production of heat-shrinkable films. However, in order to obtain a heat shrinkable film using the downward cast commercial process, the low melt strength of the linear homogeneous ethylene/alpha-olefin copolymer must be supplemented by other polymers in the film or made using a casting roll with orientation being carried out by tenter frame. Hence, some of Applicants claims are directed to multilayer films, and films in which the linear homogeneous polymer is blended with another polymer, so that the additional polymer can provide additional melt strength so that a downwardly cast tape can be extruded, cooled, reheated to its softening temperature, oriented, and quenched.

As pointed out in the 15 November 1999 Amendment, the only actual films disclosed in VAN der SANDEN et al are the 50 micron *blown* films disclosed in the paragraph spanning the bottom of the first column of Page 155 and the top of the second column of this same page. As discussed in the personal interview, blown films are not heat-shrinkable films; blown films are made from a process which is different from heat shrinkable films, and different technical challenges are involved in these different processes. VAN der SANDEN et al also states:

Each converting method (film, extrusion coating, lamination) has its own processing requirements (melt strength, thermal stability, rheology) which must be satisfied to yield the economical production of the packaging structure.

Applicants point out that this statement is in support of their position that different processing requirements apply to different film production methods. Applicants also contend that this statement stands in support Applicants' position that melt strength is critical to the production of a

heat-shrinkable film. That is, adequate melt strength must be satisfied in order to yield the economical production of the film. As Applicants have already argued, the melt strength requirements for making a heat shrinkable film are different from the melt strength requirements to make a blown film.

In summary, Applicants have pointed out that the combinations of documents utilized in the various rejections do not establish a prima facie case of obviousness of the invention as claimed in the amended claims presented hereinabove. All of Applicants' claims recite the extrudate as being cooled by cascading water, which is a process different from the blown and cast films of SCHUT and Van der SANDEN. Moreover, SCHUT teaches low melt strength of EXACT® copolymers, which teaches away from using such polymers in a downward casting process. Teachings related to blown and cast films are not applicable to heat-shrinkable films made using a downward casting process. As a result, it is improper to combine SCHUT and Van der SANDEN with any of the primary references to render Applicants' claims obvious, in spite of the fact that SCHUT refers to multilayer cast or blown films and blends of homogeneous copolymers in cast or blown films. Even if a prima facie case of obviousness has been made out (which is not the case), Applicants have pointed out their discovery of unexpected results: heat-shrinkable films higher impact strength relative to heterogeneous copolymers. This stands as yet another reason Applicants' claimed heat shrinkable films are patentable over any one of the primary references in view of SCHUT and Van der SANDEN.

V. The Rejection of Claims 1, 3, 4, 5, 6, 12, 14, 28, 35, 42, 43, 47, 49, 54, and 56 as obvious over WILHOIT

In Paragraph 6 of the 21 April Office Action, Claims 1, 3, 4, 5, 6, 12, 14, 28, 35, 42, 43, 47, 49, 54, and 56 are rejected under 35 USC 103(a) as unpatentable over U.S. Patent No. 5,403,668, to Wilhoit ("WILHOIT"). The Office Action states that WILHOIT teaches blends of VLDPE, EVA, and a plastomer to produce heat shrinkable single and multi-layer films oriented by double bubble biaxial orientation and irradiated, and that the homogeneous plastomer has a density of about 0.900 g/cc and a molecular weight distribution of less than 3, referring to the table on Column 5. The office action states that the plastomer resin would correspond with the linear homogeneous copolymer recited in the claims, and that the materials made by Mitsui using a single site vanadium catalyst have homogeneous properties. The office action goes on to state that VLDPE polymers are heterogeneous in nature, and that VLDPE has densities both less and greater than about 0.90 g/cc. Next, the office action states that the essential difference between the claims under examination and the teachings of WILHOIT is the specific use of homogeneous linear polymer (plastomer) having a density greater than about 0.906, and that the teachings of WILHOIT overlap with the claimed ranges because the term "about" gives the claim enough latitude to overlap the value of the densities of the homogeneous copolymers of WILHOIT.

In response, Applicants note that during the personal interview of 10 October, the Examiner referred specifically to Table C in Column 8 of WILHOIT, more particularly to the Mitsui polymer having a density of 0.907 g/cc was a VLDPE. The undersigned stated that this polymer appears to be a heterogeneous copolymer, not a homogeneous copolymer, and that the Tafmer® polymers all have a density which is no higher than 0.895 g/cc. The Examiner appeared

to agree that Table C of WILHOIT does not disclose a homogeneous copolymer having a density of at least about 0.906. Accordingly, it would appear that the rejection based on WILHOIT should be withdrawn.

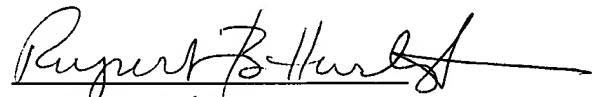
However, Applicants note that the above amendments to the claims reduce the recited density of the homogeneous ethylene/alpha-olefin copolymer in the film to "at least 0.901 g/cc." To the extent that WILHOIT is prior art with respect to Applicants' claims, WILHOIT contains no teaching or suggestion of a heat shrinkable film containing homogeneous ethylene/alpha-olefin copolymer at a density of 0.901 g/cc. The TAFMER® copolymers are homogeneous, but they all have a density of 0.895 g/cc and below. WILHOIT also contains a reference to EXACT® 3010C polymer, having a density of 0.900 g/cc. There is no teaching or suggestion to increase the density of the TAFMER® copolymers, nor to use an EXACT® copolymer having a density greater than 0.900 g/cc. The Mitsui VLDPE in TABLE C in Column 8 of WILHOIT is a heterogeneous copolymer, not a homogeneous copolymer. Finally, since WILHOIT has as an objective increasing the shrink of the film, one of skill in the art would be directed to lower the density of the homogeneous copolymer, rather than elevate the density. Accordingly, based on all of the arguments set forth above, Applicants contend that the rejection of Claims 1, 3, 4, 5, 6, 12, 14, 28, 35, 42, 43, 47, 49, 54, and 56 as obvious over WILHOIT should be withdrawn.

CONCLUSION

In view of the above amendments and arguments, Applicants respectfully contend that the claims are in condition for allowance, and Applicants respectfully request reconsideration of the claims, with a view towards allowance.

Should there be any questions or otherwise needs to discuss any matters related to this application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Respectfully Submitted,

A handwritten signature in cursive script, appearing to read "Rupert B. Hurley Jr.", written over a horizontal line.

Rupert B. Hurley Jr.

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